Social capital and mathematics achievement of fourth and fifth grade children in segregated primary schools

Abstract

With a few exceptions, scholars have demonstrated that the socioeconomic composition of the pupil body is related to academic achievement. The effect of ethnic/immigrant concentration, on the other hand, is more controversial, as some have found no impact of the ethnic/immigrant composition when other aspects were taken into account. Social capital theory claims that it is possible to compensate for a disadvantaged background or a deficient learning context when pupils benefit from being integrated in specific social structures. This article tests whether social capital is positively related to the mathematics achievement of children (n=376) in the fourth and fifth grades of primary school (n=24) in Flanders.

1. Introduction

The continuing immigration in various Western European countries has apparently triggered social and political concerns. Immigration creates new challenges for the education of coming generations. For instance, many policymakers worry about the growing school segregation (i.e. the concentration of pupils with a low socioeconomic and/or an immigrant background) happening in many European cities. The concentration of pupils with such background in specific schools is perceived as unfavourable for educational performance, but also as an obstruction to social integration and cohesion (Jenkins, Micklewright & Schnepf, 2008). Scholars of education address these concerns with a large body of studies focusing on the effects of school compositional characteristics on student outcomes (for France: Boado, 2007; for Belgium: Agirdag, Van Houtte & Van Avermaet, 2012; for the Netherlands: Van der Slik, Driessen & De Bot, 2006; for Norway: Fekjær & Birkelund, 2007; for Sweden: Brannstrom, 2008). With a few exceptions, these studies have demonstrated that the socioeconomic composition of the pupil body is related to academic achievement. That is, pupils who attend schools with a higher share of socioeconomically disadvantaged children were found to perform worse (for a meta-analysis: see Van Ewijk & Sleegers, 2010a). The effect of ethnic/immigrant concentration, on the other hand, has proven to be more controversial, as some researchers have found no impact of the ethnic/immigrant composition when other aspects were taken into account (for a meta-analysis: see Van Ewijk & Sleegers, 2010b). As such, the net effect of ethnic school segregation on pupils' academic performance remains a topic of continuing debate and research.

A recurring but highly neglected finding in these studies is the large variation in the academic performance within and between segregated schools. That is, not all segregated schools perform below average and some of the segregated schools even outperform elite schools (see Agirdag & Van Houtte, 2011). Furthermore, not all students in segregated schools perform below average and some perform above average. Given the lack of research that specifically focuses on these differences, it is not clear which factors distinguish students from high-performing segregated schools and students from the low-performing segregated schools. Examining the differences within and between segregated schools is not only important for the sake of scholarly analysis and knowledge accumulation. From a policy and practice perspective, it is also crucial to identify features that can make (a student in) a school with a disadvantaged composition successful.

A theoretical framework that is relevant in this regard is that of 'social capital' theory. This theory claims that it might be possible to compensate for a disadvantaged background or a deficient learning context when pupils benefit from being integrated in specific social structures (i.e. have access to social capital) within their family or school (Portes, 1998; Dika & Singh, 2002). A prominent advocate of social capital, Coleman, analysed students' academic achievement in terms of the effects of being in different social structures. He pointed out two forms of social capital: social capital in the family and social capital outside the family (Coleman, Hoffer & Kilgore, 1982; Coleman & Hoffer, 1987; Hoffer, 1998). Social capital in the family is high when adults are physically present in the family. Their presence entails a higher possibility that children can access available family resources (information, support, etc.). According to this perspective, families with more siblings and single parent families are bound to have lower levels of social capital (Coleman, 1988). In Coleman's view, student's relation with adult networks at school may provide 'intergenerational closure'. Students are then part of a broader parental network that surrounds the school, which he classifies as 'social capital outside the family'. Membership in such networks has its benefits, insofar as students can access its available resources (information, support, etc.). Parents in such networks also have access to the resources (information, support, etc.) of other parents, which allows them better monitoring and control of their children (Coleman, 1988).

Studies using the Coleman framework in an educational setting have focused on analysing the possible effects of social capital on educational achievement (see Carbonaro, 1998; Hoffer, 1998; Israel, Beaulieu and Hartless, 2001; Morgan & Todd, 2009). Authors have also examined the effects of social capital on academic achievement for students with and without a minority and/or immigrant background (see Bankston, 2004; Kao, 2004; Kao & Rutherford, 2007). However, research has mainly focused on children in schools without making the distinction between segregated and non-segregated schools. More specifically, it did not investigate whether Coleman's social capital theory holds among students with an immigrant and/or low socioeconomic background embedded in a segregated learning context. This is unfortunate because Coleman's contribution has emphasized the advantages of being integrated in a social network to counteract the possible lack or deficiency of resources (see also Driessen, 2002; Rumberger & Palardy, 2005; Massey & Fischer, 2006; Kao & Rutherford, 2007; Agirdag, Van Houtte & Van Avermaet, 2012).

In this article we focus on the school system in Flanders (in the upper part of Belgium). The reasons for this focus are three-fold. Firstly, the Flemish school system exhibits relatively high educational inequality compared with school systems in other European countries. (Jenkins, Micklewright & Schnepf, 2008). Secondly, school segregation within Belgium has become a source of concern in recent years (OECD, 2012; VLOR, 2014; Nusche, Miron, Santiago & Teese, 2015). More specifically, research has found that students with a particular socio-economic and ethnic background tend to be unequally distributed between schools in the Flemish school system (Jacobs, Rea & Hanquinet, 2007; Jacobs, Rea, Teney, Callier & Lothaire, 2009; Agirdag, Van Houtte & Van Avermaet, 2012; Wouters & Groenez, 2013). Thirdly, these students with a disadvantaged background also tend to lag behind in terms of academic achievement (Jacobs & Rea, 2011). If we consider the relatively high segregation and educational inequality of students in the Flemish school system (Agirdag, Van Avermaet & Van Houtte, 2013), it would be interesting to investigate the effects of social capital in this setting.

This article therefore contributes to the literature by testing whether social capital is positively related to the academic achievement and growth of Flemish primary school children who are taught in schools in which most of the students have a low socioeconomic and/or an ethnic/immigrant background (i.e. segregated schools).

2. Theoretical framework

2.1 Introduction

The concept of social capital means that "relationships matter" (Field, 2008, p. 1). Contemporary formulations of this concept in educational science start with Bourdieu and Coleman: both authors are influential in further applications of social capital in this domain of research (Dika & Singh, 2002).

Bourdieu defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group" (1986, p. 51). Coleman described social capital as "a particular resource available to an actor" that might help to achieve certain goals and fulfill ambitions (1988, p. 98). He defined social capital by the function of this resource "with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure" (1988, p. 98). Social capital is not the possession of one individual – it resides in the relationships between people. Social capital is therefore not a fixed asset or thing that people can acquire. In contrast to Bourdieu, Coleman specifically designed his social capital theory in order to explain academic achievement. In this article, we will therefore only focus on Coleman's social capital theory.

Although Coleman developed his theory on social capital with data on Catholic private, public and other private schools in the United States, research has further investigated and enriched his argument. This includes research on the number of siblings, the family structure and intergenerational closure in Western Europe and the United States (e.g. Carbonaro, 1998; Morgan & Sorensen, 1999; Bankston III & Zhou, 2002; Goddard, 2003; Van Houtte, 2004; Corten & Dronkers, 2005; Sandefur, Meier & Campbell, 2006; Woolley, Kol & Bowen, 2009; Morgan & Todd, 2009; Schlee, Mullis & Shriner, 2009; Carolan, 2012; Dufur, Parcel & Troutman, 2013; Kreidl & Hubatkova, 2014) and non-Western contexts (Eng, 2013). Coleman's distinction between two main forms of social capital are directly relevant to explaining academic achievement: social capital in the family (section 2.2) and outside the family (section 2.3).

2.2 Social capital in the family

Coleman identified single parents and the number of siblings as negative elements that inhibit academic success (1988). Coleman's theory is similar to the resource dilution theory that also focuses on family size and academic achievement (Blake, 1981). The theory of Coleman and the resource dilution theory postulate that an increase of siblings or a decrease of adult persons in the family results in less access to family resources (such as the financial capital). According to this account, because these resources are not infinite, children in families who have less access to family resources tend to have lower chances of developing themselves academically (Downey, 1995; Steelman, Powell, Werum & Carter, 2002; Chapple, 2009; Sylva, 2014).

Most research in Western Europe and the United States in the past decades has reported a negative association between sibship size, single parent families and academic achievement (Downey, 1995; Baydar, Greek & Brooks-Gunn, 1997; Steelman, Powell, Werum & Carter, 2002; Chapple, 2009). For example, Kreidl and Hubatkova (2014) documented a negative association between sibship size, single parent families and academic achievement in 40 countries using data of the Programme for International Student Assessment (PISA) (the wave of 2000). They found that students with more brothers and/or sisters and children who have a single parent perform worse on the reading literacy test (see Kreidl and Hubatkova, 2014, p. 11). Similarly, Pong, Dronkers & Hampden-Thompson (2003) found that single parenthood has a negative association with mathematics and science achievement. They used data on eleven countries of the International Math and Science Study (TIMSS, wave three).

However, a small number of scholars have questioned the resource dilution theory (Steelman, Powell, Werum & Carter, 2002) and therefore Coleman's theory of social capital in the family and its explanation of academic achievement. Some scholars have claimed that the relation between family size and academic achievement might be spurious (e.g. Guo & VanWey, 1999; Chapple, 2009; Sandberg & Rafail, 2014). They claimed that unmeasured elements related to family size and academic achievement such as parental socioeconomic status and cognitive ability confound this relation. Although the majority of research has supported a negative relation between family size and academic achievement, there are reasons to further investigate this purported association in a longitudinal research design. In this article, we hypothesize that

H1*: The number of siblings in a family is negatively related with children's academic achievement.*

H2*: Children who live in a single-parent family are more likely to have lower academic achievement than children who live in another family structure.*

2.3 Social capital outside the family

Studies of Coleman & Hoffer (1987) and Hoffer (1998) compare the performance of high school students in Catholic private, public and other private schools in the United States. In these studies, the school performance of high school students was better in Catholic private schools (Morgan & Sorensen, 1999; Corten & Dronkers, 2005, Parcel, Dufur & Zito, 2010; Hallinan & Kubitschek, 2012). In these studies, it was shown that students' relationship with adult networks provided 'intergenerational closure' and better academic performance. This form of closure exists when students are part of a broader parental network that surrounds the school. Membership in such a network has its benefits: students can access the available resources (information, support, etc.) of the network and other connected networks of the other members (Coleman, 1988, pp. 113-116). Parents in such networks also have access to the resources (information, support, etc.) of other parents, which allows them to better monitor and control their children's progress.

The existence of intergenerational closure among students and its association with academic achievement has been researched. For example, a study of Carbonaro using data from the National Education Longitudinal Study in the United States (1998) investigated whether intergenerational closure has an effect on academic achievement. The authors found that 12^{th} grade math achievement was significantly and positively related with this form of closure on the student level (under control of socio-demographic variables and parental involvement/expectations). This effect became insignificant after controlling for negative signs of integration at school (absenteeism, deviant behaviour at school and having friends who are dropouts). Thorlindsson, Bjarnason & Sigfusdottir (2007) showed with data of a survey of Icelandic adolescents (9^{th} grade and 10^{th} grade) that intergenerational closure is positively associated with math achievement. It also became insignificant after controlling for socio-demographic variables and parental and adolescent relations.

In order to test whether intergenerational closure indeed has an effect on academic achievement in this article, we hypothesize that:

H3*: Intergenerational closure of children is positively related with children's academic achievement.*

When intergenerational closure exists, children within such closed networks are more likely not only to know other children at school, but also to be more 'integrated' and have more contact with them. The formulation of the effects of intergenerational closure resembles Durkheim's theory on the social integration of members in a group. Despite the similarities between Coleman's theory on social capital and Durkheim's theory on social integration, these theories also have marked differences. Although

Coleman recognized the public character of social capital, he took the individual as his theoretical starting point, whereas Durkheim emphasizes the collective level (e.g. the union of individuals in a group) more strongly than the individual level itself ([1901] 1982, pp. 39-40).

Research has shown that the effect of intergenerational closure on academic achievement can be different at the school level. Some studies have found a negative association between academic achievement and intergenerational closure at the school level. This has also been called the “dark side of social closure”, where networks that are too dense have a negative effect on academic achievement (Carolan, 2012, p. 585). For example, Morgan & Sorensen (1999) distinguished between norm-enforcing and horizon-expanding schools. In the former, parents are strongly connected with other parents at school. The authors argue that these schools can “become suffocating communities in which excessive monitoring represses creativity and exceptional achievement” (1999, p. 663). In horizon-expanding schools, parents do not have that many connections with other parents at school. Morgan and Sorensen show with the use of data of the National Education Longitudinal Study in the United States that intergenerational closure at the school level is connected with worse achievement in mathematics. Later, Morgan and Todd (2009) found with data of the education longitudinal study that intergenerational closure has an effect on 10^{th} and 12^{th} grade mathematics achievement for Catholic schools after controlling for socio-demographic variables, student’s networks and school characteristics.

The argument that social capital might have fewer beneficial aspects in certain contexts is reminiscent of Burt’s theoretical work on structural holes and social closure. Burt (2000; 2005) argued that social closure could result in dense networks that include redundant information and possibly isolate its members. In other words, when networks become too dense, while being connected still has a positive effect on the individual level, a negative effect on academic achievement might exist. We therefore hypothesize that

H4*: Intergenerational closure of children at the school level is negatively related with their academic achievement.*

3. Methodology

3.1 Sample selection

In this article, we use data that was collected in the P.IEO study (Project 'Innovating and Excelling in Education'). The project focused on primary schools that have a high number of children with a non-native and/or a low socioeconomic background. In this article, we focus on children in the fourth and fifth grades of primary school in Flanders. For these students we have measurements of the level of social capital at home and at school. In the school years of 2013-14 and 2014-15, the children were tested on well-being and achievement: in September 2013, in April-May 2014 and in April-May 2015.

In Belgium, children are obligated to follow education from the age of 6 until the age of 18 (Baysu & de Valk, 2012). The Belgian school system uses a hierarchical tracking system of students (Phalet, Deboosere & Bastiaenssen, 2007). In this school system, primary education normally lasts six years with a transition to secondary education at the theoretical age of 12. Mainstream secondary education in Belgium includes three stages that normally take two years each (De Groof & Franck, 2013). Enrollment in this school system is driven by the principle of parental freedom of school choice.

The administration of the Belgian school system is divided among three language communities (i.e., the Flemish, French and German speaking community). The Belgian school system is a highly segregated school system that is cut along linguistic lines. However, school segregation is not only exclusive between but also within regions (Nusche, Miron, Santiago & Teese, 2015). In this study we focus on the situation of the Flemish school system. Research on segregation in the Flemish school system has shown that this is a pattern explained by both parental freedom of school choice and residential segregation in Flemish cities (e.g. Wouters & Groenez, 2014).

In the PIEO project, segregated primary schools were selected with a convenience sample technique. In the first stage of sample selection, twelve schools (half of the sample) were selected by the Flemish department of education, as they were deemed convenient with regards to their socioeconomic and non-native composition. In the second stage of sample selection, the research team selected twelve other schools that were similar in composition and context to these schools. They were situated in the same region in Flanders, Belgium (Ghent, Limburg, Brussels or Antwerp), were similar on socioeconomic and non-native composition, were in the same educational network (including subsidized official schools, subsidized private schools and community schools) and had a comparable school size and level of grade retention. All students of the fourth grade were sampled and studied until the end of the fifth grade.

The resulting sample is not a representative sample of the primary school system in Flanders, however, it is representative for other similarly segregated primary schools in Ghent, Limburg, Brussels or Antwerp with regard to two specific composition variables: the percentage of children with a mother without a higher secondary degree and the percentage of children of which no or only one family member (excluding the child) speaks the language of instruction (Dutch) at home (population data provided by the Flemish department of education).[1] We found with goodness-of-fit chi square tests that the distributions of the composition variables in the population of non-selected similarly segregated schools (>= 48% low maternal educational level or >= 47% non-Dutch speakers at home) are equal to the distributions of the selected segregated schools (respectively χ^2= 4.64, df = 3, ns; χ^2= 1.33, df = 3, ns) (see Figure one to see how our sample of schools is situated in the population of Flemish primary schools).

Insert Figure one

3.2 Variables

3.2.1 Outcome variable

The outcome variable is mathematics achievement in wave one, two and three of this project (September 2013, April/May 2014 & 2015). We administered mathematics tests designed for the Flemish population of children in the fourth and fifth grades (see also Schoolfeedbackproject, 2014). They were administered in class and included problem solving, number knowledge and elementary arithmetic operations (including addition, subtraction, fractions, divisions and decimals). The wave two test (with 50 items) and wave three test (with 61 items) were constructed as follow-ups of the first wave test (with 60 items). The Pearson correlation between the sum scores of the first and second test is 0.81 ($n_{listwise}$ = 341; p <.001), between the sum scores of the first and third test is 0.72 ($n_{listwise}$ = 346; p <.001), and between the sum scores of the second and third test is 0.76 ($n_{listwise}$ = 356; p <.001). Cronbach's alpha is 0.93 for the first and second wave and 0.94 for the third wave test ($n_{listwise}^{1st\ wave}$ = 352; $n_{listwise}^{2nd\ wave}$ = 362; $n_{listwise}^{3rd\ wave}$ = 366). We used item response theory and the theta parameterization of Mplus 7.3 to execute a concurrent calibration with items that were common and unique to the waves (in a single group design). More specifically, the common items were used to put the three tests on the same scale. We did this because otherwise we would not have comparable mathematics scores for each student. We calculated three sets of scores on a common scale from 0 (lowest ability) to 10 (highest ability) for those students who had mathematics scores on all three waves. In Mplus, we calculated equalities for the common items of each wave. We also imposed threshold invariance on the common items. The three theta variables are correlated.

3.2.2 Student level variables

At the student level, we include *background information* on gender, maternal educational level, and language spoken at home. The information on the maternal educational level has been assembled with the use of information that was handed over by the schools and parents in a parental questionnaire during wave one. Maternal educational level is coded from no primary school (0), primary school (1), lower secondary school (2), higher secondary school (3) and higher education (4). Because this variable has a low variability (most mothers in the sample are low educated: mean = 1.77; SD = 1.15; $n_{listwise}$ = 336), we dichotomized this variable to distinguish between the people without a higher secondary degree and those with at least a higher secondary degree.

The other variables were distilled from background questionnaires filled in by the children. Gender was coded as female (0) and male (1). The variable language at home measures whether children speak the language of instruction with at least one of their parents (collected in wave one). This type of variable is also partly used by the Flemish Department of Education to distinguish schools by immigrant background (VLOR, 2014). Pupils with a non-Belgian nationality and pupils with a Belgian nationality who do not speak Dutch as their home language are included in this variable. In our dataset, most students were born in Belgium (318 of 373 or 85.25%; $n_{listwise}$ = 373). The variable language at home is coded in two categories (yes = 0; no = 1). We constructed three measures on family structure that serve as *social capital in the family*: 1) single parent families (only the father or mother is present or perceived to be present at home = 1; families where the father and mother are present or perceived to be present at home = 0), 2) the number of siblings (going from 0 to 4 or more siblings, the category 4 indicates four or more siblings) and 3) the presence/absence of brothers/sisters at home (0 or 1). This information was collected in wave one.

We also have a measure of *social capital in school*. The variable on intergenerational closure of students at school gives an overview of the networks that children have with other parents. Children were asked whether they know parents of other children in their own class and outside class. The variable is coded into two categories to indicate the presence or absence of networks that are class-based (networks with parents of children in their own class or with parents of children in another class) and those networks that go beyond one class. The variable is coded as no or only networks in the own class or outside the own class (0) and networks that are outside and inside the class: an extensive network at school (1). This variable was measured in wave two of this study.

3.2.3 School level variables

At the school level, we use two composition variables that are based on the characteristics of students at wave one: the parental educational level and language composition. The parental educational level composition variable is the fifth grade class percentage of children with a mother who does not possess a higher secondary degree. A higher score on this variable indicates a lower parental educational level composition. The language composition variable is the fifth grade class percentage of children who do not speak the language of instruction (Dutch) with one of their parents. We class mean centred both composition variables.

Insert Table one

We also measured the extent of intergenerational closure. This aggregated variable is based on information that was collected during wave two of this study. We used the fifth grade class percentage of the children who know parents of friends in the class and in other classes in school at wave two. A higher percentage indicates more extensive intergenerational closure of children. We mean centred this composition variable on the class level. These three variables are aggregations of the corresponding level 1 variables.

3.3 Research design

We used the information of children for which we have data for all waves (n = 359) and children for which we do not have data for all the waves but who, according to the school administration lists, should have been present in all three waves (n = 17). We use multiple imputation (fully conditional specification) to deal with missing values. The advantage of multiple imputation is that the available information of cases in the first, second and third waves can be used to impute the missing data: no information is neglected. It produces several datasets with the use of Bayesian statistics and analyses with these data are pooled to produce estimates (Enders, 2010). We use five imputed datasets and have complete and balanced data for each student. In the imputation phase, we used all student level variables that were overviewed in this section, including for example also the score on a reading test, the nationality, the class identification variable and information on school administration (private sector or not). The models converged: we plotted the summary statistics (mean and standard deviation) for each scale variable for each iteration and imputation. After multiple imputation, we have data on 376 students in 24 fifth grade classes (one class in one school).

Three level longitudinal mixed model specifications were used to account for the variation within mathematics achievement throughout the three waves of the study (the first level of analysis: time or *t*), of *i* students (the student or second level of analysis) and among the *j* classes (the class or third level of analysis) (Gelman & Hill, 2007; Hox, 2010; Hoffman, 2015). The analyses were carried out with SPSS 21 and restricted maximum likelihood estimation.

We opted to model mathematics with a non-linear quadratic time effect (i.e. a polynomial model) because 1) the mean mathematics achievement follows a non-linear path (the mean is higher in wave two compared to wave one and lower in wave three compared to wave two) and 2) a polynomial model gave the best fitting model for time. With three waves of mathematics achievement, the highest possible polynomial model is a fixed quadratic effect, random time slope model. We use this type of model in the analyses that are reported in Table 2. We use the last wave as time zero. With interactions of the time effects and social capital variables, the main effects of the social capital variables are the effects on the mathematics achievement in the last wave. We also model the variances and covariances among random intercepts and slopes. The general form of the equations with *n* variables is:

Level 1 Time:

$$y_{tij} = \beta_{0ij} + \beta_{1ij}(Time_{tij}) + \beta_{2ij}(Time_{tij})^2 + e_{tij}$$

Level 2 Student:

$$Intercept: \beta_{0ij} = \delta_{00j} + \delta_{01j}Variable1_{ij} + \cdots + \delta_{0nj}Variable\ n_{ij} + U_{Oij}$$

$$Linear\ time: \beta_{1ij} = \delta_{10j} + \delta_{11j}Variable1_{ij} + \cdots + \delta_{1nj}Variable\ n_{ij} + U_{1ij}$$

$$Quadratic\ time: \beta_{2ij} = \delta_{20j} + \delta_{21j}Variable1_{ij} + \cdots + \delta_{2nj}Variable\ n_{ij}$$

Level 3 Class:

$$\delta_{00j} = \gamma_{000} + \gamma_{001}Variable1_j + \cdots + \gamma_{00n}Variable\ n_j + V_{00j}$$

$$\delta_{10j} = \gamma_{100} + \gamma_{101}Variable1_j + \cdots + \gamma_{10n}Variable\ n_j + V_{10j}$$

$$\delta_{20j} = \gamma_{200} + \gamma_{201}Variable1_j + \cdots + \gamma_{20n}Variable\ n_j$$

In a random student and class – before taking into account time effects – the model parameters indicate that there is a total variation across waves of 2.89. The between-student and between-class variation from the fixed intercept are respectively 1.76 and 0.43. There is a time specific within-student variation of 0.70 that remains after taking into account the person and class mean deviations from the grand mean across waves. 76% of the variation (before taking into account any effects of time) therefore exists across classes and students or the correlation of the mathematics achievement in the three waves of the same student and class is 0.76 and 20% of this 76% is across classes ($\frac{\tau^2_{V_{00}}+\tau^2_{U_{00}}}{\tau^2_{V_{00}}+\tau^2_{U_{00}}+\sigma^2_e}$ ($\frac{0.43+1.76}{0.70+1.76+0.43}$) and $\frac{\tau^2_{V_{00}}}{\tau^2_{V_{00}}+\tau^2_{U_{00}}}$ ($\frac{0.43}{0.43+1.76}$)). 24% of the variation is due to longitudinal variation.[2]

In order to test the hypotheses (see the next section), six models were constructed and reported in Table 2 and 3: 1) a model with only the time variables (linear and quadratic time effect), 2) the background variables (socioeconomic status, gender, language at home, low socioeconomic status and language composition variables), 3) a model with family social capital variables (controlling for background variables), 4) a model with social capital at school variables (controlling for background variables), 5) a model with all social capital related variables and 6) a model that includes time interactions with the other background variables (gender, language at home and socioeconomic status).

4. Results

In model 1, we report a baseline model with only the linear and quadratic time effects. In model 2, we report a model with only background variables (gender and maternal educational level and language at home at the student and class level) with wave three as time zero. Noteworthy are the effects of gender and maternal educational level: boys are significantly predicted to have 0.62 higher mathematics scores on average and children with a mother with a low educational background are predicted to have -0.46 lower mathematics scores on average.

In model 3, we test hypothesis one and two. We test whether the number of siblings in a family and living in a single parent family are negatively related with children's academic achievement. We use interaction terms between the time linear and quadratic parameters and the social capital variables to model effects on achievement growth. We see that children in a single parent family are predicted to grow slower in mathematics than children in a non-single parent family. The difference in achievement growth is the largest and most significant in wave one and two (the interaction terms). In model 3, we see that the effects of sibship size and presence of siblings at home are not significant (p-values > .10). We also analyzed with fixed school effects instead of random class effects because it might be argued that 24 schools are not many cluster units in a multilevel model. However, we found that the found effects are robust to controlling for fixed school effects (23 dummy classes) instead of random class effects.

Insert Table two

In model 4, we investigate hypothesis three and four. We hypothesized that intergenerational closure of children at respectively the student and class level is positively and negatively related with academic achievement. As in previous models, we included interaction terms between intergenerational closure and time. We therefore control for a moderation by time of the effect of intergenerational closure on mathematics growth. When children have an extensive network (they know parents of children in and outside class), they are significantly predicted to have 0.40 higher mathematics scores on average in wave three (main effect). This effect is not moderated by time. This effect is robust to controlling for fixed class effects (23 dummy classes) instead of random class effects. Model 4 also shows that intergenerational closure at the class level is not significantly related to mathematics achievement. In model 5 of Table 3, we included all variables (background and social capital variables) and see that the effects of social capital remain. In model 6, we also included interactions between the linear and quadratic time effects and socioeconomic status, gender and language at home. The effects of social capital remain. On the basis of this last model, the predicted values of the main and interaction effects of the single parent effects are plotted in figure two.

Insert Figure two

Insert Table three

We also report the proportions of total explained variance with the squared Pearson correlation between the predicted scores based on the fixed effects and the observed outcome (as in Hoffman, 2015). In model 2 with only the background variables, we find that 11.76% of the total mathematics variance was explained. In model 3 (background variables + social capital in the family) and 4 (background variables + social capital at school), respectively 12.74% and 14.21% of the mathematics variance is explained. In model 5 and 6, we explain 15.37% and 15.52% of the mathematics variance.

5. Discussion and conclusion

In this article, we investigated whether social capital is positively related to the academic achievement and growth of primary school children in segregated schools. We did this in order to see whether it offers a way to improve the achievement in these schools. An important spokesperson of social capital theory, Coleman, formulated why social capital in the family and outside the family is important. We tested this theory with the use of longitudinal data that was collected in schools that are socioeconomically and ethnically segregated.

We formulated four hypotheses: 1) The number of siblings in a family is negatively related with children's academic achievement growth. 2) Children who live in a single parent family are more likely to have lower academic achievement than children who live in another family structure. 3) Intergenerational closure of children is positively related with children's academic achievement growth. 4) Intergenerational closure of children at the school level is negatively related with children's academic achievement.

Firstly, we found insignificant effects of sibship size and negative significant effects of living in a single parent family on mathematics in the fourth and fifth grades. We therefore reject hypothesis 1 and support hypothesis 2. This is in contrast with other research that found effects for these characteristics (e.g. Kreidl & Hubatkova, 2014). A possible and tentative explanation of these results can be the different ways in which social capital operate in immigrant communities (Kao, 2004). A family with a single parent may be detrimental for the prospects of being included in networks outside the family, when this is for example perceived as a stigma within the immigrant community to which the student belongs. Moreover, immigrant pupils might need to be more close to their parents to compensate for a possible isolation in their host community. The negative effects of parent-related characteristics can therefore be more pronounced for immigrant students.

We also found that knowing more parents at school has a positive effect on mathematics achievement (hypothesis 3). This is indicative of broader networks that surround the class and supports other research (e.g. Carbonaro, 1998). This is a relevant finding since it shows that the argument of

Coleman is present even in – what is often defined as – a deficient learning context. It also shows the need to develop additional explanations to explain the lower educational achievement of disadvantaged pupils. Low educational achievement in segregated schools can be explained through peer influence (Mayer and Jencks, 1989; Caldas and Bankston, 1997). Peers in a deficient learning context tend to have lower academic achievement partly because of their low socioeconomic status. Within this context, peers can have a detrimental influence on high-achieving students. In this article however we gave additional support to the hypothesis that contact with children at school and knowing parents of children at school (i.e., having an extended network within the school) is an additional source of resources and support for students. This is because these networks can lead to higher mathematics achievement. This result is particularly relevant since peer influence has been found to be crucial for shaping (early) adolescents' attitudes, behavior and even educational performance. Further research should analyze whether this positive effect is present in other cognitive areas, such as language achievement. The longitudinal analysis in this article can also be extended to examine whether the effect of intergenerational closure stays or diminishes throughout students' further educational trajectories.

We did not find a significant negative effect of intergenerational closure at the school level and thus reject hypothesis 4. We also saw that the main effects of the socioeconomic background of the student in the different models were countered with the presence of intergenerational closure at the student level. This is a direct support of the idea of Coleman & Hoffer (1987) and Coleman (1988).

The difference between those with less social capital in the family as we defined it – namely, living in a single parent family – and those with more social capital in the family and outside the family can be interesting for devising and implementing school policy. Although the school does not have much influence on the family structure of children, they can, however, try to take the detrimental effects of family structure into account.

6. Endnotes

[1] Brothers and sisters were counted as one family member by the Flemish Department of Education.

[2] We also tested alternative covariance structures (first-order autoregressive and Toeplitz structures) but did not find any significant improvement to our models, so we stuck to the unstructured covariance structures.

7. References

Agirdag, O., & Van Houtte, M. (2011). A tale of two cities: Bridging families and schools. *Educational Leadership* 68(8), 42-46.

Agirdag, O., Van Houtte, M., & Van Avermaet, P. (2012). Why does the ethnic and socio-economic composition of schools influence math achievement? The role of sense of futility and futility culture. *European Sociological Review* 28(3), 366-378.

Bankston, C.L. (2004). Social Capital, Cultural Values, Immigration, and Academic Achievement: The Host Country Context and Contradictory Consequences. *Sociology of Education* 77(2), 176-179.

Bankston, C.L. & Zhou, M. (2002). Social Capital as Process: The Meanings and Problems of a Theoretical Metaphor? *Sociological Inquiry* 72(2), 285-317.

Baydar, N., Greek, A., & Brooks-Gunn, J. (1997). A longitudinal study of the effects of the birth of a sibling during the first 6 years of life. *Journal of Marriage and the Family* 59(4), 939-956.

Baysu, G. & de Valk, H. (2012). Navigating the school system in Sweden, Belgium, Austria and Germany: School segregation and second generation school trajectories. *Ethnicities* 12, 776-799.

Blake, J. (1981). Family Size and the Quality of Children. *Demography* 18(4), 421-442.

Boado, H. C. (2007). Immigrant concentration in schools: Peer pressures in place? *European Sociological Review*, 23(3), 341–356.

Bourdieu, P. (1986). *The forms of capital*. Handbook of Theory and Research for the Sociology of Education.

Brannstrom, L. (2008). Making their mark: The effects of neighbourhood and upper secondary school on educational achievement. *European Sociological Review* 24(4), 463-478.

Burt, R. (2000). The network structure of social capital *Research in Organizational Behavior* 22, 345–423.

Burt, R. (2005). *Brokerage and Closure: An Introduction to Social Capital*. Oxford: Oxford University Press.

Caldas, S. & Bankston, C. (1997). Effect of School Population Socioeconomic Status on Individual Academic Achievement. *The Journal of Educational Research* 90(5), 269-277.

Carbonaro, W. (1998). A Little Help from My Friends' Parents: Intergenerational Closure and Educational Outcomes. *Sociology of Education* 71, 295-313.

Carolan, B. (2012). An Examination of the Relationship Among High School Size, Social Capital, and Adolescents' Mathematics Achievement. *Journal of research on adolescence* 22(3), 583–595.

Chapple, S. (2009). *Child well-being and sole-parent family structure in the OECD: an analysis*. Paris: OECD.

Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology* 94, 95-120.

Coleman, J. (1990). *Foundations of social theory*. Harvard: Harvard University Press.

Coleman, J. & Hoffer, T. (1987). *Public and private high schools. The impact of communities*. New York: Basic Books.

Coleman, J., Hoffer, T. & Kilgore, S. (1982). *High School Achievement: Public, Catholic, and Private Schools Compared*. New York: Basic Books.

Corten, R. & Dronkers, J. (2005). Schoolprestaties van leerlingen uit de lagere strata op openbare, bijzondere en privé scholen: een cross-nationale test van de Coleman & Hoffer these. *Pedagogische Studiën* 82, 205-222.

De Groof, S. and Franck, E. (2013). Belgium (Flemish Community) In *ICCS 2009 Encyclopedia: Approaches to civic and citizenship education around the world*, J. Ainley, W. Schulz, and T. Friedman, 39-49 (Amsterdam, IEA).

Dika, S. & Singh, K. (2002). Application of social capital in educational literature: a critical synthesis. *Review of educational research* 72(1), 31-60.

Downey, D. (1995). When bigger is not better: Family size, parental resources, and children's educational performance. *American Sociological Review* 60(5), 746- 759.

Driessen, G. (2002). School Composition and Achievement in Primary Education: A Large-Scale Multilevel Approach. *Studies in Educational Evaluation* 28, 347-368.

Dufur, M., Parcel, T. & Troutman, K. (2013). Does capital at home matter more than capital at school?: Social capital effects on academic achievement. *Research in Social Stratification and Mobility* 31, 1-21.

Durkheim, E. ([1897] 2006). *Suicide*. Avon: Penguin books.

Durkheim, E. ([1901] 1982). *The rules of sociological method and selected texts on sociology and its method*. New York: The Free Press.

Enders, C. (2010). *Applied Missing Data Analyses*. New York: Guilford Press.

Eng, S. (2013). Cambodian Early Adolescents' Academic Achievement: The Role of Social Capital. *The Journal of Early Adolescence* 33(3): 378-403.

Fekjaer, S. N., & Birkelund, G. E. (2007). Does the ethnic composition of upper secondary schools influence educational achievement and attainment? A multilevel analysis of the Norwegian case. *European Sociological Review* 23(3), 309–323.

Field, J. (2008). *Social Capital*. London: Routledge.

Furstenberg, F.F & Hughes, M.E. (1995). Social Capital and Successful Development among At-Risk Youth. *Journal of Marriage and Family* 57(3), 580-592.

Gelman, A., & Hill, J. (2007). *Data analysis using regression and multilevel/hierarchical models*. Cambridge: Cambridge University Press.

Gijsberts, M. & van der Ploeg, R. (2015). School Achievement of Immigrant Children: The Decreasing Influence of Ethnic Concentration, JIMI, *Journal of International Migration and Integration*, 1-23.

Goddard, R. (2003). Relational networks, social trust, and norms: a social capital perspective on students' chances of academic success. *Educational evaluation and policy analysis* 25(1), 59-74.

Guo, G. & Van Wey, L. (1999). Sibship size and intellectual development: Is the relationship causal? *American Sociological Review* 64, 169–187.

Hallinan, M. & Kubitschek, W. (2012). A Comparison of Academic Achievement and Adherence to the Common School Ideal in Public and Catholic Schools. *Sociology of Education* 85, 1-22.

Hoffer, T. (1998). Social Background and Achievement in Public and Catholic High Schools. *Social Psychology of Education*, 2, 7-23.

Hoffman, L. (2015). *Longitudinal Analysis. Modeling Within-Person Fluctuation and Change*. NY & London: Routledge.

Hox, J. (2010). *Multilevel analysis : techniques and applications*. NY & London: Routledge.

Israel, G, Beaulieu, L & Harless, G. (2001). The Influence of Family and Community Social Capital on Educational Achievement. *Rural Sociology* 66(1), 43-68.

Jacobs, D. & Rea, A. (2011). *Verspild talent*. Brussel: Koning Boudewijstichting.

Jacobs, D., Rea, A. & Hanquinet, L. (2007). *Prestaties van de leerlingen van buitenlandse herkomst in België volgens de PISA-studie: vergelijking tussen de Franse gemeenschap en de Vlaamse gemeenschap*. Brussel: Koning Boudewijnstichting.

Jacobs, D., Rea, A., Teney, C., Callier, L. & Lothaire, S. (2009). *De sociale lift blijft steken. De prestaties van allochtone leerlingen in de Vlaamse Gemeenschap en de Franse Gemeenschap*. Brussel: Koning Boudewijnstichting.

Jenkins, S., Micklewright, J. & Schnepf, S. (2008). Social segregation in secondary schools: how does England compare with other countries. *Oxford Review of Education* 34(1), 21-37.

Kao, G. (2004). Social Capital and Its Relevance to Minority and Immigrant Populations. *Sociology of Education* 77, 172-5.

Kao, G. & Rutherford, L.T. (2007). Does social capital still matter? Immigrant minority disadvantage in school-specific social capital and its effects on academic achievement. *Sociological Perspectives* 50(1), 27-52.

Kreidl, M. & Hubatkova, B. (2014). Does coresidence with grandparents reduce the negative association I sibship size and reading test scores? Evidence from 40 countries, *Research in social stratification and mobility* 38, 1-17.

Marsden, P. (2005). The sociology of James S. Coleman. *Annual Review of Sociology* 31, 1-24.

Massey, D.S. & Fischer, M.J. (2006). The effect of childhood segregation on minority academic performance at selective colleges. *Ethnic and Racial Studies* 29(1), 1-26.

Mayer, S. & Jencks, C. (1989). “Growing up in poor neighbourhood: how much does it matter?” *Science* 243(4897): 1441-5.

Morgan, S. & Sorensen, A. (1999). Parental networks, social closure, and mathematics learning: a test of Coleman's social capital explanation of school effects. *American Sociological Review* 64, 661-81.

Morgan, S. and Todd, J. (2009). Intergenerational closure and academic achievement in high school: a new evaluation of Coleman's conjecture. *Sociology of education* 82 (3), 267-285.

Muthén L. and Muthén B. (2012). *Mplus User's guide. Seventh Edition.* Los Angeles, CA: Muthén and Muthén.

Nusche, D., Miron, G., Santiago, P. & Teese, R. (2015) *Reviews of School Resources: Flemish Community of Belgium* 2015, OECD, Reviews of Schools Resources, OECD Publishing, Paris.

OECD (2012). *Equity and Quality in Education: Supporting Disadvantaged Students and Schools,* OECD Publishing.

Parcel, T. Dufur, M. & Zito, R. (2010). Capital at home and at school: a review and synthesis. *Journal of marriage and family*, 72, 828-846.

Pong, S., Dronkers, J. & Hampden-Thompson, G. (2003). Family policies and children's school achievement in single- versus two-parent families. *Journal of marriage and family* 65(3), 681-699.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24, 1–24.

Rumberger, R.W. & Palardy, G.J. (2005). Does segregation still matter? The impact of student composition on academic achievement in high school. *Teachers College Record*, 107(9), 1999–2045.

Ryabov, I. & Van Hook, J. (2007). School Segregation and Academic Achievement among Hispanic Children. *Social Science Research*, 36, 767-788.

Sandberg, J. & Rafail, P. (2014). Family size, cognitive outcomes, and familial interaction in stable, two-parent families: United States, 1997-2002. *Demography* 51(5), 1895-1931.

Sandefur, G. Meier, A. & Campbell, M. (2006). Family resources, social capital, and college attendance. *Social Science Research*, 35, 525-553.

Schlee, B. Mullis, A. & Shriner, M. (2009). Parents social and resource capital: predictors of academic achievement during early childhood. *Children and youth services review*, 31, 227-234.

Schoolfeedbackproject (2014) http://www.schoolfeedback.be

Steelman, L., Powell, B., Werum, R. & Carter, S. (2002). Reconsidering the effects of sibling configuration: recent advances and challenges. *Annual review of sociology* 28, 243-269.

Sylva, K. (2014). The role of families and pre-school in educational disadvantage. *Oxford Review of Education*, 40(6), 680-695.

Thorlindsson, T. Bjarnason, T. & Sigfusdottir, I. (2007). Individual and community processes of social closure: a study of adolescent academic achievement and alcohol use. *Acta sociologica* 50(2), 161-178.

Van der Slik, F., Driessen, G., & De Bot, K. (2006). Ethnic and socioeconomic class composition and language proficiency: a longitudinal multilevel examination in Dutch elementary schools. *European Sociological Review* 22(3), 293–308.

Van Ewijk, R., & Sleegers, P. (2010a). The effect of peer socioeconomic status on student achievement: A meta-analysis. *Educational Research Review* 5(2), 134-150.

Van Ewijk, R., & Sleegers, P. (2010b). Peer ethnicity and achievement: a meta-analysis into the compositional effect. *School Effectiveness and School Improvement* 21(3), 237-265.

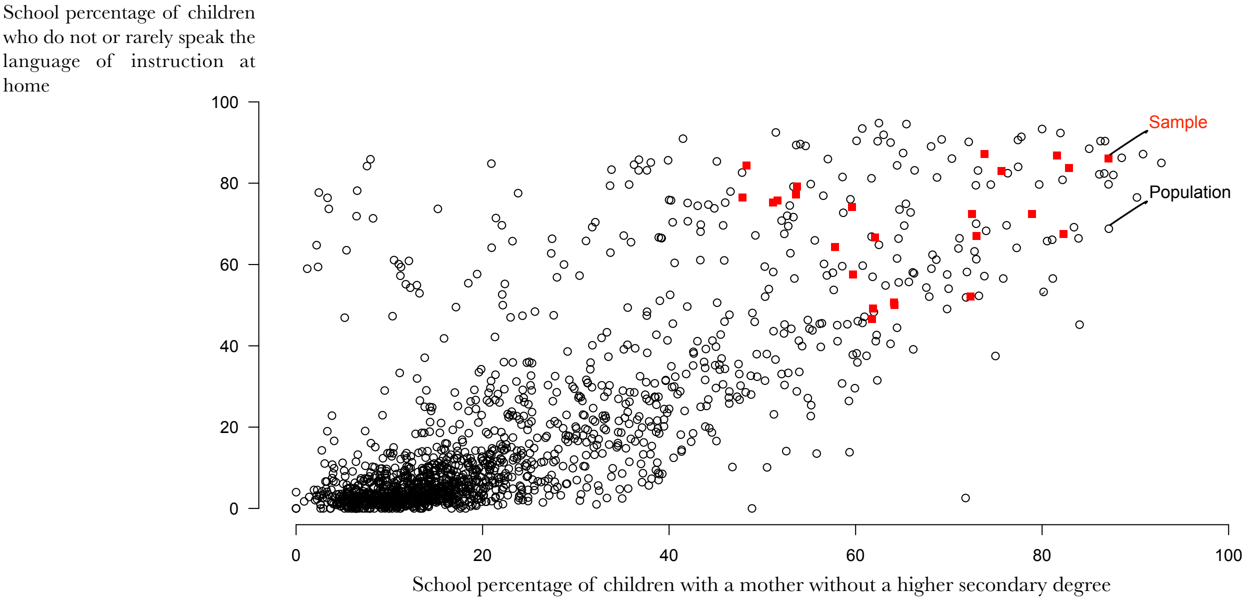
Van Houtte, M. (2004). Sociaal kapitaal in katholieke en gemeenschapsscholen in Vlaanderen: een vergelijking. *Pedagogische studiën* 81, 28-41.

Vlaamse Onderwijsraad (VLOR) (2014). *Analytical report: Education for pupils with a migrant background in Flanders*. Flemish Education Council.

Woolley, M., Kol, K. & Bowern, G (2009). The Social Context of School Success for Latino Middle School Students. Direct and Indirect Influences of Teachers, Family and Friends. *Journal of Early Adolescence* 29, 43-70.

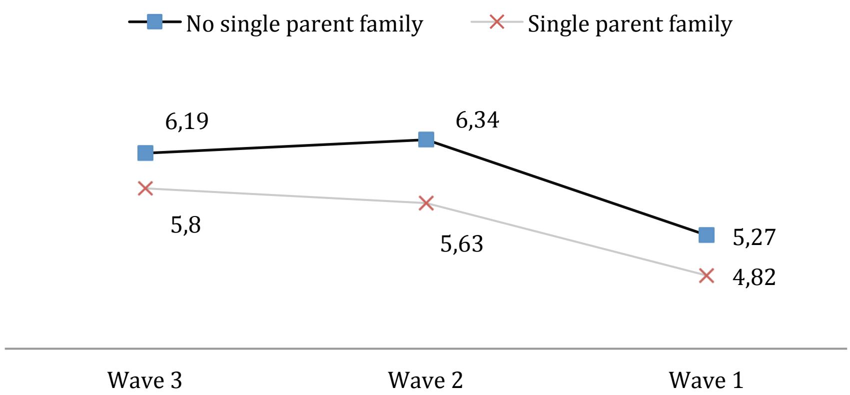
Wouters, T. & Groenez, S. (2013). *De evolutie van schoolse segregatie in Vlaanderen. Een analyse voor de schooljaren 2001-2002 tot 2011-2012*. Leuven: Steunpunt SSL.

Figure 1. *Scatterplot of the population and sample of Flemish primary schools*



Note: data source = Flemish Department of Education, own calculations.

Figure 2. *Predicted mathematics achievement in the fourth and fifth grade*



Note: the figure is based on model 6, table 3: 6.19+0.76($Time_{tij}$)-0.61($Time_{tij}^2$)-0.39($SingleParent_{ij}$)-0.61($SingleParent_{ij} * Time_{tij}$)+0.29($SingleParent_{ij} * Time_{tij}^2$).

Table 1. *Descriptive statistics of the variables*

Variables	*Range*	*N*	*Pooled mean or % (SD)*	*% imputed*
Student level				
Background characteristics				
1. Male	0-1	376	47.50%	0.80%
2. Low level of maternal education	0-1	376	67.71%	10.64%
3. No Dutch spoken at home	0-1	376	20.27%	3.46%
Social capital characteristics				
4. Brother(s) and/or sister(s) at home	0-1	376	93.19%	5.85%
5. Single parent family	0-1	376	10.37%	6.12%
6. Number of brothers/sisters	0-4	376	2.30 (1.14)	8.51%
7. Intergenerational closure at school	0-1	376	35.37%	5.05%
Outcome variables				
8. IRT mathematics achievement (wave 1)	0-10	376	5.06 (1.54)	10.64%
9. IRT mathematics achievement (wave 2)	0-10	376	5.93 (1.74)	10.64%
10. IRT Mathematics achievement (wave 3)	0-10	376	5.87 (1.66)	10.64%
Class level				
11. Low level of maternal education (class %)	40-98.57%	24	67.85% (15.66)	4.17%
12. No Dutch spoken at home (class %)	4.76-60%	24	20.99% (14.46)	0%
13. Intergenerational closure at school (class %)	10-73.33%	24	35.41% (15.59)	0%

Table 2. *Multilevel longitudinal models: estimates with standard errors in parentheses*

	Model 1: only time	*Model 2: background variables*	*Model 3: background + family social capital*
Intercept	5.85 (0.18)***	5.93 (0.22)***	6.35 (0.38)***
Linear Time Slope	0.53 (0.10)***	0.53 (0.10)***	0.67 (0.20)**
Quadratic Time Slope	-0.47 (0.04)***	-0.47 (0.04)***	-0.55 (0.09)***
Variance components			
Class Random Intercept Variance $\tau^2_{V_{00}}$	0.60 (0.22)**	0.63 (0.24)**	0.64 (0.24)**
Class Intercept-Linear Covariance $\tau_{V_{00,10}}$	-0.12 (0.06)+	-0.14 (0.06)*	-0.14 (0.07)*
Class Random Linear Slope Variance $\tau^2_{V_{10}}$	0.07 (0.03)**	0.07 (0.03)**	0.07 (0.03)**
Student Random Intercept Variance $\tau^2_{U_{00}}$	1.99 (0.19)***	1.85 (0.17)***	1.84 (0.17)***
Student Intercept-Linear Covariance $\tau_{U_{00,10}}$	-0.10 (0.05)*	-0.09 (0.05)+	-0.09 (0.05)+
Student Random Linear Slope Variance $\tau^2_{U_{10}}$	0.09 (0.02)***	0.09 (0.02)***	0.09 (0.02)***
Residual Variance σ^2_e	0.31 (0.02)***	0.31 (0.02)***	0.31 (0.02)***
% total explained variance	5.52%	11.76%	12.74%
Background characteristics			
Male		0.62 (0.16)***	0.60 (0.16)***
Low level of maternal education		-0.46 (0.17)**	-0.43 (0.17)*
No Dutch spoken at home		-0.30 (0.21)	-0.29 (0.21)
Social capital characteristics			
Single parent family			-0.35 (0.28)
Number of brothers/sisters			-0.07 (0.08)
Brother(s) and/or sister(s) at home			-0.24 (0.33)
Linear time slope * Single parent family			-0.57 (0.27)*
Quadratic time slope * Single parent family			0.27 (0.12)*
Linear time slope * Sibship size			-0.03 (0.07)
Quadratic time slope * Sibship size			0.02 (0.03)
Intergenerational closure (student level)			
Linear time slope * Intergenerational closure			
Quadratic time slope * Intergenerational closure			
Class level			
Low level of maternal education		-0.13 (1.00)	-0.15 (0.99)
No Dutch spoken at home		-1.42 (1.06)	-1.36 (1.07)
Intergenerational closure			
Linear time slope * Intergenerational closure			
Quadratic time slope * Intergenerational closure			
No. of Parameters	10	15	22
-2Log Likelihood	3246.79	3218.38	3228.36
AIC	3260.79	3232.38	3242.36
Schwarz's BIC	3295.97	3267.52	3277.46

Note: wave 3 = time 0; + indicates p <.10, * indicates p <.05, ** indicates p <.01, *** indicates p <.001, two tailed significance test; restricted maximum likelihood estimation; 5 imputed datasets.

Table 3. *Multilevel longitudinal models: estimates with standard errors in parentheses*

	Model 4: background + social capital at school	*Model 5: All social capital related variables*	*Model 6: + more time interactions*
Intercept	5.79 (0.23)***	6.21 (0.38)***	6.19 (0.38)***
Linear Time Slope	0.45 (0.11)***	0.60 (0.21)**	0.76 (0.24)**
Quadratic Time Slope	-0.44 (0.05)***	-0.53 (0.09)***	-0.61 (0.11)***
Variance components			
Class Random Intercept Variance $\tau^2_{V_{00}}$	0.64 (0.24)**	0.64 (0.24)**	0.64 (0.24)**
Class Intercept-Linear Covariance $\tau_{V_{00,10}}$	-0.14 (0.07)*	-0.14 (0.07)*	-0.14 (0.07)*
Class Random Linear Slope Variance $\tau^2_{V_{10}}$	0.07 (0.03)*	0.07 (0.03)*	0.07 (0.03)*
Student Random Intercept Variance $\tau^2_{U_{00}}$	1.81 (0.17)***	1.80 (0.17)***	1.81 (0.18)***
Student Intercept-Linear Covariance $\tau_{U_{00,10}}$	-0.10 (0.04)*	-0.10 (0.04)*	-0.10 (0.05)*
Student Random Linear Slope Variance $\tau^2_{U_{10}}$	0.09 (0.02)**	0.09 (0.02)***	0.09 (0.02)***
Residual Variance σ^2_e	0.31 (0.02)***	0.31 (0.02)***	0.30 (0.02)***
% total explained variance	14.21%	15.37%	15.52%
Background characteristics			
Male	0.63 (0.16)***	0.61 (0.16)***	0.59 (0.17)***
Low level of maternal education	-0.47 (0.17)**	-0.44 (0.17)*	-0.39 (0.19)*
No Dutch spoken at home	-0.27 (0.20)	-0.26 (0.20)	-0.27 (0.23)
Linear time slope * Male			0.18 (0.16)
Quadratic time slope * Male			-0.09 (0.07)
Linear time slope * Low SES			-0.43 (0.16)**
Quadratic time slope * Low SES			0.22 (0.07)**
Linear time slope * No Dutch spoken at home			-0.07 (0.20)
Quadratic time slope * No Dutch spoken at home			0.05 (0.09)
Social capital characteristics			
Single parent family		-0.39 (0.27)	-0.39 (0.27)
Number of brothers/sisters		-0.07 (0.08)	-0.07 (0.08)
Brother(s) and/or sister(s) at home		-0.25 (0.32)	-0.25 (0.32)
Linear time slope * Single parent family		-0.61 (0.28)*	-0.61 (0.28)*
Quadratic time slope * Single parent family		0.29 (0.12)*	0.29 (0.12)*
Linear time slope * Sibship size		-0.04 (0.07)	-0.01 (0.07)
Quadratic time slope * Sibship size		0.02 (0.03)	0.01 (0.03)
Intergenerational closure (student level)	0.40 (0.19)*	0.41 (0.19)*	0.41 (0.19)*
Linear time slope * Intergenerational closure	0.23 (0.18)	0.25 (0.18)	0.25 (0.18)
Quadratic time slope * Intergenerational closure	-0.08 (0.08)	-0.09 (0.08)	-0.09 (0.08)
Class level			
Low level of maternal education	-0.12 (1.00)	-0.15 (1.00)	-0.16 (0.99)
No Dutch spoken at home	-1.68 (1.10)	-1.63 (1.10)	-1.64 (1.10)
Intergenerational closure	-1.50 (1.21)	-1.54 (1.21)	-1.54 (1.21)
Linear time slope * Intergenerational closure	-0.46 (0.64)	-0.60 (0.64)	-0.59 (0.64)
Quadratic time slope * Intergenerational closure	0.28 (0.25)	0.34 (0.25)	0.34 (0.24)
No. of Parameters	21	28	34
-2Log Likelihood	3212.08	3220.56	3230.41
AIC	3226.08	3234.56	3244.41
Schwarz's BIC	3261.19	3269.63	3279.44

Note: wave 3 = time 0; + indicates p <.10, * indicates p <.05, ** indicates p <.01, *** indicates p <.001, two tailed significance test; restricted maximum likelihood estimation; 5 imputed datasets.